Cornell Law Review

Volume 99
Issue 2 *January 2014*

Article 3

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ESSAY

THE DIRECT COSTS FROM NPE DISPUTES

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In the past, "non-practicing entities" (NPEs), popularly known as "patent trolls," have helped small inventors profit from their inventions. Is this true today or, given the unprecedented levels of NPE litigation, do NPEs reduce innovation incentives? Using a survey of defendants and a database of litigation, this paper estimates the direct costs to defendants arising from NPE patent assertions. We estimate that firms accrued $29 billion of direct costs in 2011. Although large firms accrued over half of the direct costs, most of the defendants were small or medium-sized firms. Moreover, an examination of publicly listed NPEs indicates that little of the direct costs represents a transfer to small inventors.

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Introduction

Over the past decade, the American patent system has experienced an explosion of patent litigation initiated by parties called "Non-practicing Entities" (NPEs).[1] The term "non-practicing entity" identifies parties who own and sometimes assert patents but do not practice the technology covered by their patents.[2] Commentators agree that there has been an explosion of NPE patent litigation and that NPE lawsuits differ in important ways from other patent lawsuits,[3] but they disagree in their normative assessments of this phenomenon.[4] We believe that this explosion is troubling, and herein we present evidence that NPE litigation imposes substantial direct costs on high-tech innovators with little apparent offsetting benefit to inventors or innovators[5] from assertion of NPE patents.

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1 James Bessen, Jennifer Ford & Michael J. Meurer, *The Private and Social Costs of Patent Trolls*, Regulation, Winter 2011–12, at 26, 26, *available at* http://www.cato.org/sites/cato.org/files/serials/files/regulation/2012/5/v34n4-1.pdf; *Litigations over Time*, PatentFreedom, https://www.patentfreedom.com/about-npes/litigations/ (last updated Aug. 6, 2013).

2 *See* Bessen et al., *supra* note 1, at 26. The "troll" label is applied to NPEs that behave opportunistically or cause social harm. *Id.* *But see* Highland Plastics, Inc. v. Sorensen Research & Dev. Trust, CV 11-02246 SJO, slip op. at 3 (C.D. Cal. Aug. 17, 2011), *available at* http://www.iplawalert.com/uploads/file/Highland%20Plastics%20v%20Sorensen%20Rsrch.pdf (denying motion to strike "patent troll" from the complaint because it "is a term commonly used and understood in patent litigation and is not so pejorative as to make its use improper"). Colleen Chien coined the term "Patent Assertion Entities" (PAEs) to specifically identify NPEs who assert patents rather than play some other intermediary role in the market for patent rights or the market for technology. Colleen Chien, Assistant Professor, Santa Clara Univ., Presentation to the FTC/DOJ Hearing on Patent Assertion Entities: Patent Assertion Entities (Dec. 10, 2012), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2187314.

3 John R. Allison, Mark A. Lemley & Joshua Walker, *Extreme Value or Trolls on Top? The Characteristics of the Most-Litigated Patents*, 158 U. Pa. L. Rev. 1, 12–20 (2009) [hereinafter Allison et al., *Extreme Value*]; John R. Allison, Mark A. Lemley & Joshua Walker, *Patent Quality and Settlement Among Repeat Patent Litigants*, 99 Geo. L.J. 677, 686–89 (2011) [hereinafter Allison et al., *Repeat Patent Litigants*]; Bessen et al., *supra* note 1, at 29.

4 *Compare* Bessen et al., *supra* note 1, at 31 (finding that NPE lawsuits caused half a trillion dollars in lost wealth from 1990 through October 2010 and that this loss of wealth has reduced incentives to innovate), *with* Mark A. Lemley & A. Douglas Melamed, *Missing the Forest for the Trolls*, 114 Colum. L. Rev. (forthcoming 2014) (manuscript at 4), *available at* http://ssrn.com/abstract=2269087 (arguing that practicing-entity patent lawsuits are often a greater policy concern than NPE patent lawsuits).

5 We use the term "inventor" to refer to the creator of a new technical idea that may be eligible for patent protection. We use the term "innovator" to refer to a party who develops technical ideas into new technology with commercial value.

In this Essay, we present results from a unique survey of firms targeted by NPE patent assertions.[6] We augment the survey results with information derived from a comprehensive database of NPE litigation and information derived from publicly traded NPEs' financial disclosures. We find that: (1) the estimated direct, accrued costs of NPE patent assertions totaled $29 billion in 2011; (2) much of this burden falls on small and medium-sized companies; (3) publicly traded NPEs likely cost small and medium-sized firms more money than these NPEs transfer to inventors; and (4) the distribution of costs imposed by NPEs is highly skewed, probably because NPEs pursue a range of different business strategies.

The survey we will describe is unique in three ways. First, it includes defendant companies that are privately held, including small firms. Second, it reveals information about costs associated with cases in which NPE patents are asserted but that are resolved before a lawsuit is filed. Finally, it provides aggregated information about NPE patent license fees. These kinds of information have not been available in part because the terms of patent licenses are often secret,[7] and in part because previous surveys have simply not asked about assertions that did not advance to the filing of lawsuits. The costs disclosed by this survey are significant and should play a prominent role in policy debates about the treatment of NPE patent lawsuits.

Our survey results are largely consistent with the only other study of NPE-litigation costs, a study we completed recently with coauthor Jennifer Ford.[8] In contrast to the $29 billion annual-cost figure estimated in this Essay, we previously estimated the annual cost of NPE litigation to publicly traded American firms to be about $80 billion.[9] The previous analysis used a slightly different data set, a very different empirical approach, and a different concept of "cost." Rather than surveying defendants and asking them to report costs, we observed the stock market reaction to the filing of an NPE lawsuit against a defendant firm.[10] We estimated litigation cost by analyzing stock-price movements associated with lawsuit filings.[11]

We are not surprised that the survey generated lower costs than the stock market event study because the survey measures only direct

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6 The survey was conducted by RPX, a firm that helps companies manage risk from exposure to patent litigation. The Coalition for Patent Fairness paid RPX to defray part of the expense of conducting this survey.

7 *See* Mark A. Lemley & Nathan Myhrvold, *How to Make a Patent Market*, 36 HOFSTRA L. REV. 257, 257 (2007) (noting that even if a patent or "ones like it have been licensed dozens of times before, the terms of those licenses, including the price itself, will almost invariably be confidential").

8 Bessen et al., *supra* note 1.

9 *Id.* at 31.

10 *See id.* at 28–31.

11 *See id.* at 28–29.

costs from NPE patent assertions while the earlier study measured total costs.[12] Direct costs include the cost of outside legal services, licensing fees, and other costs incurred in response to NPE-litigation risk. Indirect costs captured by our event-study methodology include the opportunity costs of the effort exerted by legal, managerial, engineering, and scientific personnel inside the firm, and other business disruption costs such as loss of goodwill, loss of market share, and disruption of innovative activities.

This new study also complements our earlier study by providing information on companies that are not publicly listed, including small companies. This information helps reveal the extent to which NPEs help small and medium-sized firms realize profits from their innovations and the extent to which small and medium-sized firms, to the contrary, incur costs as the targets of NPEs.

NPEs are individuals and firms who own patents but do not directly use their patented technology to produce goods or services, instead asserting their patents against companies that do produce goods and services.[13] In the past, some NPEs have played a valuable role in bringing innovations from small inventors to market.[14] Some inventors lack the resources and expertise needed to successfully license their technologies or, if necessary, to enforce their patents.[15] NPEs provide a way for these inventors to earn rents that they might not otherwise realize, thus providing them with greater incentives to innovate.[16] But in the past, also, some NPEs have used patents opportunistically. For example, during the late nineteenth century, "patent sharks" were widely seen as extracting money from innocent individual farmers and railroad companies.[17]

However, while NPEs have been around for a long time, over the last few years, NPE litigation has reached a wholly unprecedented

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12 *See id.*

13 *Id.* at 28.

14 *See* James F. McDonough III, Comment, *The Myth of the Patent Troll: An Alternative View of the Function of Patent Dealers in an Idea Economy*, 56 EMORY L.J. 189, 190 (2006); Sannu K. Shrestha, Note, *Trolls or Market-Makers? An Empirical Analysis of Nonpracticing Entities*, 110 COLUM. L. REV. 114, 115–16 (2010).

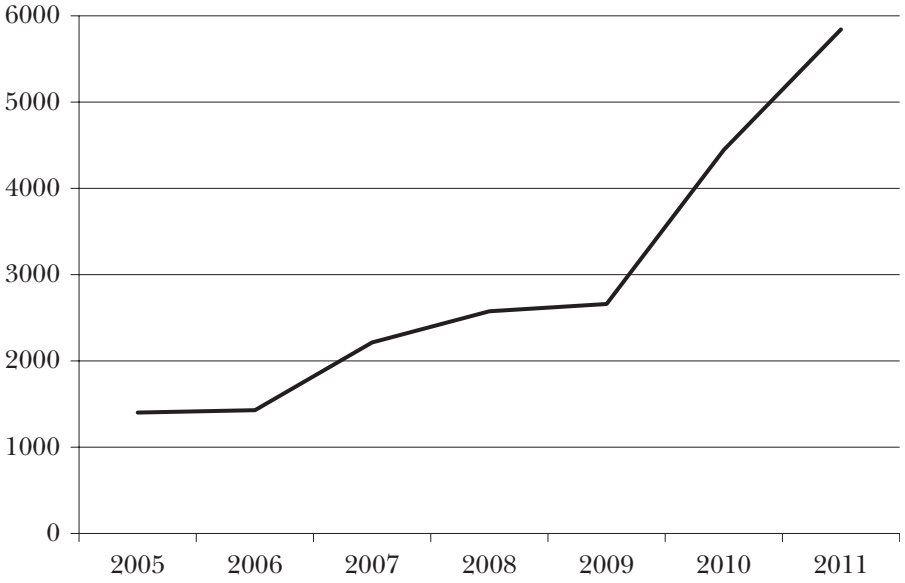
15 McDonough, *supra* note 14, at 210 ("Individual inventors and small entities rarely have the financial resources to commence and sustain a lawsuit. . . . [The] relatively high cost has the effect of inhibiting the abilities of individual inventors and small entities to enforce their patents against large corporations.").

16 *See* Ashish Arora, *Patents, Licensing, and Market Structure in the Chemical Industry*, 26 RES. POL'Y 391, 395–97 (1997). *See generally* Naomi R. Lamoreaux & Kenneth L. Sokoloff, *Inventors, Firms, and the Market for Technology in the Late Nineteenth and Early Twentieth Centuries*, *in* LEARNING BY DOING IN MARKETS, FIRMS, AND COUNTRIES 19, 31–40 (Naomi R. Lamroeaux, Daniel M.G. Raff & Peter Temin eds., 1999) (discussing the relationships between inventors and the firms to which inventors assigned their patent rights).

17 Gerard N. Magliocca, *Blackberries and Barnyards: Patent Trolls and the Perils of Innovation*, 82 NOTRE DAME L. REV. 1809, 1829, 1833 (2007).

scale and scope.[18] In 2011, 2150 unique companies were forced to mount 5842 defenses in lawsuits initiated by NPEs.[19] Moreover, the number of defenses has been growing rapidly, as seen in Figure 1. Part of this growth has been fueled by new sources of funding and new business models.[20]

FIGURE 1. NUMBER OF DEFENDANTS IN NPE LAWSUITS



Source: RPX database

I
LITERATURE REVIEW

Large-scale NPE patent litigation is a recent development, so the empirical literature is limited, but it is growing rapidly. Our NPE-lawsuit event study is the most closely related piece of earlier research; in it we found that the annual wealth lost from NPE lawsuits was about

18 *See Litigations over Time*, PATENTFREEDOM, https://www.patentfreedom.com/about-npes/litigations/ (last updated Aug. 6, 2013); *NPE Impact*, RPX, http://www.rpxcorp.com/index.cfm?pageid=45 (last visited Oct. 15, 2013).

19 These figures come from the RPX database described below. About 4% of these defenses were mounted as declaratory actions rather than infringement suits; these were nevertheless initiated by the NPEs. The figure for 2011 reflects, to some extent, an effort by NPEs to initiate litigation before the America Invents Act took effect and restricted multiparty lawsuits. Nevertheless, the trend shown in Figure 1 illustrates rapid growth before 2011.

20 *See* EXEC. OFFICE OF THE PRESIDENT, PATENT ASSERTION AND U.S. INNOVATION 5–6 (2013), *available at* http://www.whitehouse.gov/sites/default/files/docs/patent_report.pdf; Andrei Hagiu & David B. Yoffie, *The New Patent Intermediaries: Platforms, Defensive Aggregators, and Super-Aggregators*, 27 J. ECON. PERSP. 45, 51–52 (2013).

$80 billion for publicly traded U.S. firms.[21] In theory, this cost could be composed mostly of transfers in the form of royalty payments to NPEs. Indeed, a number of papers argue that NPEs play a socially valuable role by enabling small inventors to realize greater profits from their inventions.[22] These papers, however, do not provide empirical evidence to support that assertion.

Our 2011 paper rejected that possibility based on the evidence available to us; we concluded that much of the cost borne by technology companies as they defend against NPE lawsuits is a social loss and not a mere transfer.[23] The survey results we describe below provide strong additional support for our view that much of the cost imposed on defendants is a social loss. In particular, the current study finds that NPEs impose costs not only on large technology companies but also on many small and medium-sized firms, making it even less likely that innovative start-ups are net beneficiaries of NPE activity.

One other researcher has quantified the costs to defendants from NPE litigation. Catherine Tucker examines the effect of a lawsuit by an NPE (Acacia) against several firms that make medical-imaging software.[24] She compares the impact of the lawsuit on sales of both medical-imaging and text-based medical software produced by the targeted firms.[25] She also compares the sales by the targeted firms to the sales of medical-imaging software made by other firms in the industry who were not targeted with a lawsuit.[26] She finds that sales of medical-imaging software declined by one-third for targeted firms.[27] She attributes the sales decline to a "lack of incremental innovation in

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21 Bessen et al., *supra* note 1, at 31.

22 *See generally* Spencer Hosie, *Patent Trolls and the New Tort Reform: A Practitioner's Perspective*, 4 I/S: J.L. & POL'Y FOR INFO. SOC'Y 1, 13 (2008) (arguing that the negative perception of patent trolls does not reflect their true nature and that patent reform will stunt technological innovation); McDonough, *supra* note 14, at 208–11 (arguing that having the resources to provide a credible threat of litigation will maximize the earning potential of the patent for the small inventor); Marc Morgan, Comment, *Stop Looking Under the Bridge for Imaginary Creatures: A Comment Examining Who Really Deserves the Title* Patent Troll, 17 FED. CIR. B.J. 165, 172–76 (2008) (arguing that certain patent trolls act as market intermediaries for small inventors and prevent big corporations from bullying these small inventors); Nathan Myhrvold, *The Big Idea: Funding Eureka!*, HARV. BUS. REV., March 2010, at 40, 47 (arguing that NPEs provide options for monetizing patents that create a more efficient market); Shrestha, *supra* note 14, at 126–30 (arguing that an NPE's capital and resources provide negotiating power for small inventors to enable better prices for their inventions).

23 Bessen et al., *supra* note 1, at 31–32.

24 Catherine Tucker, Patent Trolls and Technology Diffusion (Mar. 26, 2013) (unpublished manuscript), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1976593.

25 *See id.* at 10–16.

26 *See id.*

27 *Id.* at 19 ("The magnitudes of the estimates suggests [sic] roughly a drop of one-third of sales after litigation commenced.").

the period when litigation is ongoing,"[28] and she conjectures that incremental innovation was deterred by concerns that it would create additional risks in the ongoing litigation.[29]

Two other strands of previous research are especially relevant to this project. First, earlier work has quantified legal fees associated with patent litigation. We collected data about legal fees that were made public in court decisions concerning fee shifting in patent cases.[30] Also, the American Intellectual Property Law Association (AIPLA) conducts a biannual survey of its members and includes questions about fees in patent lawsuits.[31] The sources are helpful and we report some of their findings below, but they do not contain information about NPE litigation in particular, and they do not contain information about assertions that never reach the filing of a lawsuit.

A better-developed strand of literature reports various characteristics of NPE litigation.[32] While not measuring costs, these studies do shed light on the question of whether the private losses to firms targeted by NPE patent assertions also tend to be social losses. The answer appears to be "yes." NPE patent litigation has all the hallmarks of patent notice failure that distorts the patent system and makes it impede technological progress.[33] In *Patent Failure*, we show that the U.S. patent system works well for chemical and pharmaceutical inventions because the system provides clear notice to the world of the scope and existence of patent-based property rights.[34] For most other

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28 *Id.* at 5.

29 *Id.* at 26.

30 *See* James Bessen & Michael J. Meurer, *The Private Costs of Patent Litigation*, 9 J.L. ECON. & POL'Y 59, 80–81 (2012).

31 *See, e.g.*, AM. INTELLECTUAL PROP. LAW ASS'N, REPORT OF THE ECONOMIC SURVEY 2011 (2011).

32 This includes Allison et al., *Repeat Patent Litigants*, *supra* note 3; Colleen V. Chien, *Of Trolls, Davids, Goliaths, and Kings: Narratives and Evidence in the Litigation of High-Tech Patents*, 87 N.C. L. REV. 1571 (2009) (noting that while NPEs are not responsible for the majority of high-tech patent suits, NPEs typically sue multiple defendants, thus increasing their overall impact); Brian J. Love, *An Empirical Study of Patent Litigation Timing: Could a Patent Term Reduction Decimate Trolls Without Harming Innovators?*, 161 U. PA. L. REV. 1309 (2013) (noting, among other things, that the majority of litigation towards the end of a patent's term is dominated by NPEs); Michael Risch, *Patent Troll Myths*, 42 SETON HALL L. REV. 457 (2012) (dispelling myths surrounding the ten most litigious NPEs); David L. Schwartz, *The Rise of Contingent Fee Representation in Patent Litigation*, 64 ALA. L. REV. 335 (2012) (explaining why there has been a rise in contingent-fee representation in patent litigation); and Tucker, *supra* note 24. Other studies have looked at the characteristics of NPE patents asserted in lawsuits, including Allison et al., *Extreme Value*, *supra* note 3; Timo Fischer & Joachim Henkel, *Patent Trolls on Markets for Technology: An Empirical Analysis of NPEs' Patent Acquisitions*, 41 RES. POL'Y 1519 (2012); and Shrestha, *supra* note 14.

33 *See* EXEC. OFFICE OF THE PRESIDENT, *supra* note 20, at 8; BRIAN T. YEH, CONG. RESEARCH SERV., R42668, AN OVERVIEW OF THE "PATENT TROLLS" DEBATE 9 (2013); Bessen et al., *supra* note 1, at 34.

34 JAMES BESSEN & MICHAEL J. MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK 15–19 (2008).

inventions, especially software and business methods, notice failure means that innovative firms are targeted in patent infringement suits through no fault of their own.[35]

Notice failure is likely for NPE lawsuits. Sixty-two percent of the time, they feature software patents,[36] which are notoriously difficult to interpret. John R. Allison, Allison, Mark A. Lemley, and Joshua Walker study patents litigated multiple times and usually asserted by NPEs; they find that software patents account for 72% of such lawsuits.[37] The patents asserted in NPE lawsuits are often subject to lengthy prosecutions, which delay public access to information about patent claims.[38] Rather than transferring technology and aiding R&D, it appears that NPEs usually arrive on the scene after the targeted innovator has already commercialized some new technology.[39]

II
DATA

A. Survey

Between February and April 2012, RPX invited about 250 companies to participate in a survey of their NPE-related costs. The pool of invitees included RPX clients and nonclient companies with whom RPX has relationships. Most invitees were technology companies, but certain nontechnology companies with NPE exposure were also invited (for example, retailers with e-commerce exposure). Participants provided information to the extent that doing so was consistent with their obligations to third parties. The information was aggregated and rendered anonymous such that individual data was not disclosed.[40]

Participants filled out a standardized Excel template that included a range of questions about their NPE-related costs. The instructions for the template asked that participants include certain statistics estimating all of their direct (external spend) NPE-related costs from 2005 to 2011. An NPE was defined to include patent assertion entities (PAEs) and other parties using the same definition as the NPE Lawsuit Database (discussed below). A list of each participant's NPE litigations from that database was provided to ensure alignment between the survey response and database. Templates were submitted

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35 *Id.* at 191–203.

36 Bessen et al., *supra* note 1, at 29.

37 Allison et al., *Extreme Value*, *supra* note 3, at 18.

38 *See id.* at 12–16; Love, *supra* note 32, at 21; Risch, *supra* note 32, at 490–91.

39 *See* FED. TRADE COMM'N, THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION 75–80 (2011).

40 Although RPX provided data for this study, RPX did not exercise control over the substance of our text.

by e-mail or directly into a secure online data room. To the extent possible, an RPX study team reviewed the submission for quality and completeness. If needed, the company was asked certain follow-up questions. Finally, RPX aggregated the submitted data within a secure computing environment. The resulting data set forms the basis of the data tables provided in this document.

Of the 250 companies invited to participate, 82 provided data on lawsuits, and of these, 46 also provided data on nonlitigation patent assertions and related costs.

B. NPE Lawsuit Database

In addition to the survey, we also used a comprehensive database of NPE litigation developed by RPX. These NPE-litigation statistics are based on cases coded "830 Patent" in the PACER database, which is maintained by the Administrative Office of the U.S. Courts.[41] In case counts, RPX excludes misfiles, nonpatent, false marking and other non-core patent infringement cases. When a case is transferred, RPX counts it as one case and allocates it to the venue to which it was transferred. When several cases are consolidated into one, RPX counts it as one case but with multiple defendants. When a case is severed, RPX counts it as separate cases. In defendant counts, RPX rolls up operating-company subsidiaries into a parent entity (e.g., Samsung Group and Samsung Electronics count as one defendant).[42]

RPX defines NPEs to include patent assertion entities, individual inventors, universities, and noncompeting entities (operating companies asserting patents well outside the area in which they make products and compete). RPX identifies NPEs through a manual review process. In this review process, RPX reads patent complaints found in PACER and checks information in the complaint against its NPE database. RPX also checks its database of plaintiff counsel, searches public filings, and performs web research. Some of the factors that they consider when determining whether a company is an NPE (or more specifically a PAE) include: Is the entity the same as or does it share a substantial financial link with a known PAE? Is there any evidence that the company sells a product or offers a service? Does the entity webpage prominently mention technology, licensing, and patents? Does the entity webpage offer any product or sales? Does the complaint indicate whether the entity has a product in market or in development that is being harmed by infringement? Are the lawyers

41 This database does not include patent disputes before the International Trade Commission.

42 Declaratory actions are included in case counts unless otherwise noted.

involved known to specialize in representing NPEs? Is this entity known as an NPE or as an established operating company?[43]

This definition of NPE is broader than some other definitions. There is no consensus among researchers on the proper definition of NPE.[44] Schwartz and Kesan have criticized our reliance on a broad definition because it reaches plaintiffs like universities who are more meritorious in some sense.[45] They argue that because the database includes lawsuits filed by universities and other supposedly meritorious plaintiffs, it overstates the costs generated by "bad" trolls.[46] It is surely difficult to attempt to distinguish "good" NPEs from "bad" ones—some people argue that universities sometimes are bad players who occasionally abuse overly broad patents.[47] But the difficulty of divining the true nature of NPEs does little to distort our conclusions for two reasons.

First, relatively little of the patent litigation we study comes from universities—only about 1% of the NPE lawsuits.[48] Instead, the lawsuits in the RPX database were overwhelmingly filed by "patent assertion entities."[49] In fact, the RPX database closely matches other efforts to categorize litigants. The lawsuit counts are very similar to those compiled by Patent Freedom.[50] Also, Colleen Chien checked the RPX database against her own categorization of 1000 lawsuits and found little difference.[51] So our definition of NPE is hardly "unconventional," as Schwartz and Kesan claim.[52] Moreover, changes to our database, such as excluding universities, are likely to have only a small impact on our aggregate estimate of direct costs.

Second, although universities perform research that is extremely valuable to society and although most university licensing is done in a socially efficient manner, universities create social costs when they en-

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43 There are a range of views among scholars and policymakers about the appropriate definition of NPE, and different analysts are likely to assemble different NPE-litigation databases. Based on our experience researching patent litigation, we believe that the RPX database yields statistics that are consistent with information about NPE patent litigation from other sources.

44 *See* David L. Schwartz & Jay P. Kesan, *Analyzing the Role of Non-Practicing Entities in the Patent System*, 99 CORNELL L. REV. 425, 429–30 (2014) (explaining the disagreement among researchers on whether individual inventors and universities should be considered NPEs).

45 *Id.* at 440–42.

46 *Id.*

47 *See* Mark A. Lemley, *Are Universities Patent Trolls?*, 18 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 611, 619 (2008) ("The result is a felt sense among a lot of people that universities are not good actors in the patent system.").

48 Colleen Chien, *Patent Trolls by the Numbers*, PATENTLY-O (Mar. 14, 2013, 6:31 AM), http://www.patentlyo.com/patent/2013/03/chien-patent-trolls.html.

49 *Id.*

50 *See id.* (noting that RPX reported 2921 PAE lawsuits while Patent Freedom reported 2923 NPE lawsuits).

51 *Id.*

52 Schwartz & Kesan, *supra* note 44, at 440–41.

gage in patent litigation, especially against defendants who have inadvertently infringed. The problem of cost that we identify is not based on the identities, motives, or other activities of the NPEs but instead simply on the excessive litigation the NPEs create. From this perspective, we are no less sanguine about excessive litigation among practicing companies, a point we highlight in our book, *Patent Failure*.[53] And so our estimate of $29 billion implies socially wasteful litigation-related expenditures and reduced innovation incentives even if it includes university litigation. We discuss this topic more in Part V.C.

C. Sample Characteristics

Table 1 compares characteristics of the survey sample with RPX's database of NPE-lawsuit defenses. Data for the survey are on the left, while data for the entire database of NPE-lawsuit defenses are on the right. The 82 surveyed companies collectively mounted 1184 defenses in NPE lawsuits beginning between 2005 and 2011. Of these, 784, or 66%, ended in adjudication or settlement and did not involve indemnification or other factors that cause costs to be atypical.

TABLE 1. SUMMARY STATISTICS OF SAMPLE

	Sample				All NPE lawsuits			
	Companies	Lawsuit Defenses	Lawsuits/ Company	Mean Revenue ($million)	Companies	Lawsuit Defenses	Lawsuits/ Company	Mean Revenue ($million)
Number	82	1,184	14.4	$12,474.7	9,385	20,565	2.2	$3,243.3
Resolved Lawsuits		784				15,486		
Percent Resolved		66%				75%		
Company Size	Share	Share			Share	Share		
Small/Medium	44%	13%	2.7	$297.1	90%	59%	1.4	$82.6
Large	56%	88%	14.9	$22,005.0	10%	41%	9.0	$16,666.4
Company Industry								
Software	37%	26%	6.7	$7,103.1	22%	31%	3.1	$3,654.8
Hardware	63%	74%	11.2	$15,573.7	78%	69%	1.9	$3,087.2
Public company	72%				14%			

Notes: For 2005–2011. The left panel describes the sample used for this study. The right panel reports summary statistics from RPX's database of all NPE lawsuits. In the sample, all companies reported revenue. In the RPX database, only 74% of companies have reported revenue; we assume that companies without reported revenue are small or medium-sized. The resolved lawsuits have been terminated due to settlement or adjudication. The number of resolved suits excludes those that were simple transfers, had zero litigation costs (e.g., for incorrect defendants), where the company was substantially indemnified, or where the costs borne by the company do not reflect the total direct costs of litigation for other reasons. Revenues are for the most recent year. Small and medium-sized companies are those with revenues of less than or equal to $1 billion; large companies are those whose revenues exceed this amount. Companies identified as "software" include companies whose main product is software, e-commerce, finance, or undefined. "Hardware" includes everything else.

Note that a possible truncation bias arises because so many lawsuits were unresolved at the time of the survey. Because lengthier dis-

53 *See* BESSEN & MEURER, *supra* note 34, at 120–46 (noting a patent litigation "explosion" in recent years and discussing the possible reasons for such litigation (internal quotation marks omitted)).

putes tend to be more costly, at least with respect to legal costs, and because the number of lawsuit filings has risen sharply in recent years, cost estimates based only on resolved lawsuits might be understated.[54]

We divided the companies into subcategories based on their revenue in the most recent year reported (small and medium-sized at under $1 billion or large at over $1 billion) and whether they were in the broad software industry (including e-commerce and finance) or instead in a hardware industry (everything else).[55] The latter distinction might be significant because most hardware industries involve greater sunk capital costs than do software industries or finance, and for this reason hardware industries may be more at risk of holdup.[56]

The right panel shows that small and medium-sized firms dominate the universe of NPE-lawsuit defendants. Small and medium-sized companies make up 90% of the defendant firms, mounting 59% of the defenses. Firms making less than $100 million in revenue account for 82% of the defendants and 50% of the defenses.[57]

As the Table shows, our survey sample consists of companies that are larger, are more likely to be public, and experience relatively more lawsuits than the average NPE-lawsuit defendant firm. In the rows that control for size and industry sector, survey firms appear to experience about twice as many lawsuits as do companies in the comprehensive database. This is not surprising; however, it raises the possibility that our sample might be unrepresentative of the broader population, possibly experiencing costs that are greater or smaller than those of the universe of all sued companies. Below, we do some tests to see whether the survey appears to have unrepresentative costs.[58]

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54 *See* Jay P. Kesan & Gwendolyn G. Ball, *How Are Patent Cases Resolved? An Empirical Examination of the Adjudication and Settlement of Patent Disputes*, 84 WASH. U. L. REV. 237, 243–45, 257–58 (2006).

55 To preserve data confidentiality, statistical analysis was performed by RPX personnel working under our direction.

56 Readers should be mindful of the distinction between the industry of the defendant and the technology covered by the patent asserted by the NPE. In particular, it is important to recognize that problematic software patents are often asserted against hardware manufacturers.

57 This estimate assumes that firms with unreported revenue have revenues of less than $100 million.

58 *See infra* Part III.B.

III
Findings

A. Mean and Median Costs

Table 2 provides estimates of mean legal costs,[59] licensing costs, and total costs (the sum of these) with standard errors in parentheses. The last column also shows median total costs.

Table 2. Mean Litigation Costs per Defense in Millions of Dollars

	Direct Legal Costs		Licensing Costs		Total Cost	
	Mean	Median	Mean	Median	Mean	Median
All	1.38 (0.26)	0.20	6.53 (1.76)	0.22	7.91 (1.86)	0.56
Company Size						
Small/Medium	0.42 (0.12)	0.07	1.33 (0.42)	0.18	1.75 (0.49)	0.32
Large	1.52 (0.30)	0.23	7.27 (2.01)	0.23	8.79 (2.13)	0.65
Industry						
Software	1.50 (0.41)	0.17	1.82 (0.45)	0.30	3.32 (0.81)	0.55
Hardware	1.33 (0.33)	0.21	8.14 (2.35)	0.18	9.48 (2.48)	0.59

Addendum on Legal Costs

AIPLA Survey (2011)	
Cost Through Discovery	0.49 – 3.60
Cost Through Trial	0.92 – 6.00
Fee-Shift Cases (Bessen and Meurer 2012)	
Summary Judgments	0.84
Trial	3.64

Note: Standard errors in parentheses. The total number of cases is 666; subcategory shares are listed in Table 1. Fee-shift data have been deflated to 2011 dollars.

Median total costs per litigation defense fall roughly around half a million dollars, with the figure smaller for small and medium-sized firms and larger for big ones. However, mean total costs are *much* higher, nearly $8 million for our survey sample. This difference implies that the distribution of costs is highly skewed, which we explore below.[60] Thus, one must be particularly careful in extending judgments about the costs of litigation based on small samples. While "typical" costs might only be a few hundred thousand dollars, mean

59 In the survey, estimated legal costs for a particular case were specified as: Value of any legal costs related to this matter through December 31, 2011. Include outside counsel (lead and local), experts, discovery costs, prior art searching, jury consultants, graphics, other expenses, and other related costs. Include any costs that were ultimately recouped or expected to be recouped by indemnification agreements or other mechanisms. Exclude in-house legal costs.

60 *See infra* Part III.C.

costs—reflecting the large costs in a small number of very costly lawsuits—are an order of magnitude higher.

Mean total costs are, not surprisingly, significantly greater for large companies than for small and medium-sized companies. This difference is significant at the 1% level.

The first column reports the legal component of costs. Mean legal costs per defense range from $420,000 for small and medium-sized companies to $1.52 million for large companies.

Column 2 of Table 2 reports the dollar amounts paid to the plaintiff to settle the case (characterized as a licensing cost).[61] Column 3 reports the total costs, the sum of legal and settlement costs. The mean settlement costs for small and medium-sized companies are $1.33 million and for large companies are $7.27 million. Mean total litigation costs are $1.75 million for small and medium-sized companies and $8.79 million for large companies.

Legal costs are about a third as large as settlement costs or about one-quarter of total litigation costs (and slightly larger for small and medium-sized companies).[62] This implies that a substantial part of the direct costs of NPE litigation is a deadweight loss to society.[63]

Also note that NPE litigation is relatively more costly to smaller companies. In our sample, the large companies' litigation costs were five times as high as small and medium-sized companies' litigation costs. But, as demonstrated in Table 1, the mean revenue of large companies in our sample is nearly seven times the mean revenue of the small and medium-sized companies. This means that, roughly speaking, smaller companies pay more in direct NPE-litigation costs relative to their size.

Hardware firms have higher costs than software firms. This difference is significant at the 5% level. Since hardware firms generally have greater sunk costs than software firms, this difference is consistent with the interpretation that hardware firms are more easily subject to holdup and hence have to pay more to settle litigation.

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61 In the survey, estimated settlement costs for a particular case were specified as: "Value of settlement. If a running royalty, estimate the present value of royalties. If there was an exchange of patents or other non-standard deal structure then estimate expected present value cost of that deal." Settlement costs include damages awards in a small number of cases.

62 Weighting the ratios in Table 2 to represent the relative weights of small and large companies in the total database, legal costs are 23% of the total and licensing costs are 77%.

63 The indirect costs of NPE lawsuits, such as those measured by Bessen et al., *supra* note 1, at 31–33, and Tucker, *supra* note 24, at 28–29, are likely to be a more significant source of deadweight loss.

B. Comparison to Other Studies

As noted above, the survey sample was not randomly selected and hence could be unrepresentative. In particular, it might be that survey respondents tended to be firms with higher-than-average litigation costs.

We can check the representativeness of our sample by comparing our findings to other empirical evidence. First, we compare our survey results to two different measures of patent litigation costs; then we compare our measures of NPE assertion costs to data on NPE licensing revenue. AIPLA conducts a biannual survey of its members, who estimate their typical legal costs through discovery and through trial.[64] They report these estimates for three categories of patent lawsuits depending on the amount at issue in the controversy—specifically, there is a separate category for whether the amount at issue is less than $1 million, between $1 million and $25 million, or greater than $25 million.[65] The first and third categories provide the ranges shown in the addendum to Table 2.[66] Few patent lawsuits, including NPE lawsuits, go to trial,[67] so the figure for costs through discovery is more comparable to our survey results. The AIPLA cost estimates are comparable or even higher than the mean direct legal costs estimates from our survey.[68]

This crude comparison can be refined in two ways. First, we make an adjustment to the AIPLA figures to account for the fact that most patent lawsuits terminate before discovery is complete. We made this adjustment in previous work[69] and derived an estimate of expected patent-litigation costs from the AIPLA survey responses of $483,000.[70] This figure is about one-third of the mean direct legal cost in our survey, but notice that it is very close to the median total

64 *See* AM. INTELLECTUAL PROP. LAW ASS'N, *supra* note 31, at 1.

65 *Id.* at 35.

66 For the middle range, the estimated costs are $1.6 million through discovery and $2.8 through trial.

67 *See* Kesan & Ball, *supra* note 54, at 259 ("We . . . find that approximately 80% of patent cases settle.").

68 *See infra* Table 2 (reporting the survey's finding of $420,000 to $1.52 million in direct legal costs and AIPLA's finding of $490,000 to $3.6 million in costs through discovery).

69 We are grateful to David Schwartz and Jay Kesan for observing that we failed to make this adjustment in our initial, working-paper version. We developed the adjustment used here in Bessen & Meurer, *supra* note 30, at 82.

70 Bessen & Meurer, *supra* note 30, at 82. We explained:

> The expected legal cost associated with filing a patent lawsuit depends on the frequency of each of the different ways a lawsuit may be terminated. Kesan and Ball analyze patent lawsuit termination data available from the Administrative Office of the Federal Judiciary. After examining 5,207 lawsuits filed in 1995, 1997, and 2000, they found that most cases terminate short of trial, summary judgment, or through other substantive court rulings.

direct cost of $560,000 reported in Table 2. This median number includes *settlement payments* as well as direct legal costs. The median direct legal costs are merely $200,000, which is lower than the adjusted legal-cost figure from the AIPLA survey. This brings us to an important question of interpretation—do AIPLA survey respondents report means or medians? We cannot tell from the survey question, but we suspect that respondents interpret "typical costs" as median costs.

We also compared the survey means to mean legal fees from patent cases in the years from 1985 to 2004 in which a patent owner was required to pay the defendant's legal fees.[71] Converted into 2011 dollars, the cost for lawsuits that ended in summary judgments was $840,000; the cost for those that ended in a trial verdict was $3.64 million. Making the same adjustment as above to account for early termination of cases yields an expected mean cost of $409,000. This mean is lower than the mean from our survey sample but not surprisingly different given the escalation in patent-litigation costs because of the growth in electronic discovery in the past decade.

It is possible, of course, that our survey might report representative legal costs but unrepresentative licensing costs. This might happen, for instance, if our survey overrepresented hardware companies,

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> In particular, 4.6% of lawsuits reached trial, 8.5% of lawsuits terminated with a summary judgment, dismissal with prejudice, or confirmation of an arbitration decision, and the remaining 86.9% of cases terminated earlier in the process.
>
> Kesan and Ball constructed . . . two proxies for legal fees in patent lawsuits: number of days until the suit terminates, and number of documents filed. Their data showed that suits that go to trial last about 1.5 times [as many days] as suits that end with a summary judgment, and suits that end with a summary judgment last about 1.5 times [as many days] as all other suits. Further, their data showed that suits that go to trial generate about 2.5 times as many documents as suits that end with a summary judgment, and suits that end with a summary judgment generate about 2.5 times as many documents as all other suits. Assuming that the expected legal cost in a suit that ends before summary judgment is one-half of the cost of a suit that reaches summary judgment, then the estimated amount for the alleged infringer is . . . $483,000.

Id. (footnotes omitted).

Schwartz and Kesan offer two interesting conjectures about the differences between NPE litigation and other patent litigation. First, "NPE cases are often filed in speedy venues" and thus are faster and cheaper than the patent suits studied by Kesan and Ball. Schwartz & Kesan, *supra* note 44, at 437. And second, because "[c]ompetitor litigation is more document intensive and is frequently litigated more heavily by both parties (e.g., due to the injunction risk)," they believe that NPE litigation must be less expensive than competitor litigation. *Id.* at 438 n.65. They conclude that the AIPLA survey costs are likely to be high compared to NPE litigation costs. *Id.* Their conjectures may be correct, but their conclusion does not necessarily follow. NPE-litigation costs may be higher on average than litigation costs in typical patent lawsuits because the stakes tend to be higher and because holdup problems are especially severe (since defendants are larger than in typical suits and more suits are concentrated in high-tech industries).

71 See Bessen & Meurer, *supra* note 30, at 80–81, for an explanation of how we compiled these cases and our accompanying table of results.

which tend to have relatively higher licensing costs. However, Table 1 suggests that the share of hardware firms in the survey roughly matches the share in the universe of NPE-lawsuit defendants found in the database. Based on our survey, firms with higher licensing costs tend to have higher legal costs, all else equal.[72] This is likely because firms facing a large payout can typically reduce the payout or the likelihood of having to pay damages in trial by mounting a more aggressive (and more expensive) legal defense.[73]

Our confidence in our licensing-cost results is strengthened by independent evidence we have developed on the licensing revenue earned by NPEs. We obtained licensing revenue from disclosures[74] by the 10 publicly listed firms that were predominantly in the patent-assertion business during the period from 2005 to 2010 (Acacia, Asure, Interdigital, Mosaid, Network-1, OPTi, Rambus, Tessera, Virnetx, and Wi-Lan). We matched these firms to the filed lawsuits listed in Patent Freedom's NPE-litigation database.[75] These companies filed lawsuits against 1,450 companies during this period, accounting for about one-sixth of all PAE lawsuits filed in the Patent Freedom database.

During the period from 2005 through 2010, licensing revenues totaled nearly $6 billion. The mean licensing revenue per lawsuit defense comes to $3.8 million in 2010 dollars. This figure is quite close to the estimates we obtained from the survey. Averaging the mean licensing cost for different firm sizes as given in Table 2, weighted by the proportion of small or medium-sized and large firms in the total sample (as done in Table 4), also gives a combined average of $3.8 million.[76] The estimate from the publicly listed PAE firms includes licensing revenues from nonlitigated patent assertions, while the estimate based on Table 2 does not. But the data from the publicly listed firms does not account for accruals—much of the licensing revenue from lawsuits filed in 2010 was collected not in 2010 but later. This means that the estimate from publicly listed PAE firms tends to be relatively understated. Taking both of these differences into account, the two estimates are broadly similar.

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72 *See infra* Table 2 (reporting higher licensing costs in addition to higher legal costs for large firms compared with the lower licensing costs and legal costs for small and medium-sized firms).

73 *See generally* Avery Katz, *Judicial Decisionmaking and Litigation Expenditure*, 8 INT'L REV. L. & ECON. 127, 137 (1988) (analyzing a model in which parties' probability of victory is a function of their legal expenditures).

74 We obtained licensing revenues from the firms' 10-K forms.

75 Patent Freedom is an independent company that collects data on PAEs and provides advice and risk assessment. For details on the database and the matching procedure, see Bessen et al., *supra* note 1, at 28.

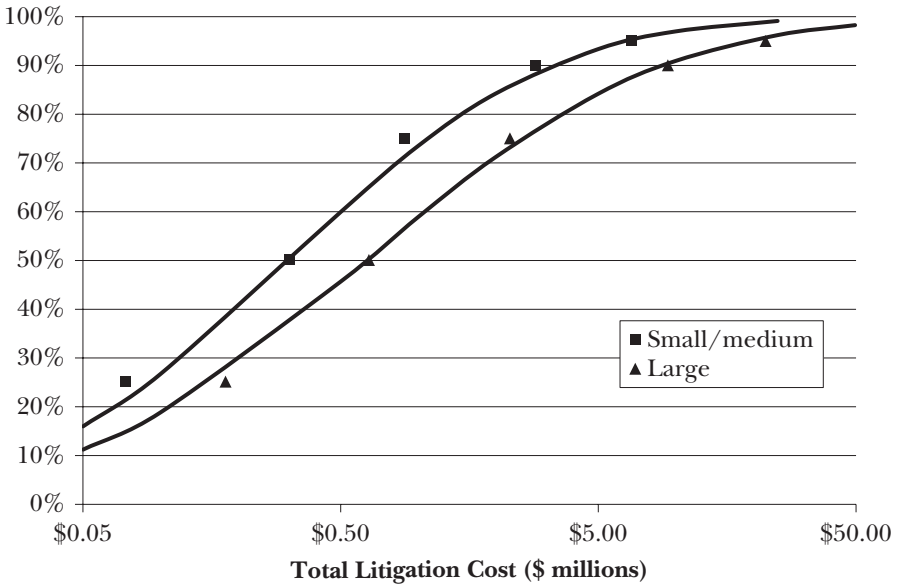
76 1.33 x 59% + 7.27 x 41% = 3.77. If instead we use the regression in the Appendix to predict litigation cost for the entire sample in the RPX database—this should better adjust for firm size differences—the weighted average cost comes to $3.2 million.

In summary, when we use data from a very different sample and use a very different methodology, we obtain results that are quite comparable. The close similarity of these means suggests that sample-selection issues do not substantially bias the survey findings. It is possible, of course, that *both* samples could be biased the same amount for different reasons, but that seems unlikely.

C. The Distribution of Litigation Costs

Sample means do not capture the distribution of costs. In fact, litigation costs are highly heterogeneous. Figure 2 shows cumulative distribution plots of total litigation costs for the small and medium-sized companies and the large companies in our sample. The smooth curves represent lognormal distribution functions fitted to the data.

FIGURE 2. CUMULATIVE DISTRIBUTION OF TOTAL DIRECT LITIGATION COST BY COMPANY SIZE



Note: Horizontal axis is logarithmically scaled. Distributions are fit with lognormal cumulative distribution functions. The distributions are for resolved lawsuits.

As can be seen, the distribution is highly skewed. The median total litigation cost for small and medium-sized companies is $318,000 and for large companies is $646,000. A large fraction of lawsuits cost less than $200,000. But a small number of lawsuits cost much, much more. For large companies, 5% of the lawsuits cost more than $22 million.

This heterogeneity likely arises in part from variation in NPE tactics. Schwartz reports that some NPEs pursue nuisance suits in which

they sue many companies, big and small.[77] Plaintiffs using this tactic are willing to settle for small payments, often no more than the amount a defendant would spend on legal fees to defend the case.[78] As one such plaintiff lawyer put it, "An NPE . . . intuitively understands that we could go for triples or home runs, but we can also go for singles and get a good return and work on other things."[79] Alternatively, NPEs may act like big-game hunters, targeting only one or a few firms but expecting to win at least several million dollars.[80] The lawsuit by NTP against BlackBerry-maker RIM is a good example.[81] There, "NTP asserted patents of doubtful validity but managed to win at trial and obtain a settlement of $612.5 million from RIM."[82] The survey data does not permit us to clearly identify NPE tactics, but it does suggest that NPE activity is not uniform.

While there are far fewer suits initiated by *big-game hunters*, they represent a disproportionate share of the cost. The distribution of costs is such that the top 5% of defenses for large companies account for about two-thirds of the total cost of defense for large companies.

D. Costs from Nonlitigated Patent Assertions

Many NPE patent assertions are settled without a lawsuit being filed.[83] To gather information on nonlitigated assertions, the survey also asked a series of questions regarding these costs. Rather than count assertions, the survey asked respondents to report cumulative costs. Most reported costs for the period from 2005 to 2011, but some did not have data for the entire period. Moreover, only 46 of the companies completed this section of the survey.

The costs of nonlitigated assertions include legal fees and settlement costs paid to patent holders. They also include smaller amounts spent on NPE-specific patent-buying programs (including RPX services), on NPE-specific clearance searches, and on reexaminations of NPE patents.

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77 *See* Schwartz, *supra* note 32, at 370 ("The patents are enforced against an entire industry, or alternatively against a slew of defendants in a single lawsuit.").

78 *See id.* at 370–71 (noting that some demands are as low as $5,000).

79 *Id.* at 371.

80 *See* Patrick Anderson, *Do NPE's "Cost" Us $29 B? Intellectual Ventures Co-Founder Peter Detkin Sets the Record Straight*, GAMETIME IP (June 28, 2012), http://gametimeip.com/2012/06/28/do-npes-cost-us-29-b-intellectual-ventures-co-founder-peter-detkin-sets-the-record-straight/ (discussing the settlement amount of $612.5 million obtained by NTP from RIM).

81 *See* BESSEN & MEURER, *supra* note 34, at 49–50 (illustrating the case as an example of a several-million-dollar settlement agreement).

82 Anderson, *supra* note 80 (internal quotation marks omitted).

83 *See* Fischer & Henkel, *supra* note 32, at 1 (noting that "NPE patent disputes are often settled out of court").

The means of these components are reported in Table 3 along with the cumulative litigation costs incurred by these same companies. For the sample as a whole, nonlitigation NPE-induced costs were about half of the comparable litigation costs. For small and medium-sized companies in particular, however, nonlitigation costs exceeded litigation costs.[84] This might be because smaller firms lack internal legal resources, making it relatively more expensive for them to pursue litigation. Also, nonlitigation costs were higher relative to litigation costs for hardware firms, perhaps again because hardware firms, being more at risk of holdup, find it less costly to settle sooner. Nonetheless, this difference is not statistically significant.

TABLE 3. NONLITIGATION COSTS PER COMPANY IN MILLIONS OF DOLLARS

	Mean Cost			TOTAL Nonlitigation Cost		Comparable Litigation Cost	
	Legal	Licensing	Other	Mean		Mean	
All	0.50	24.59	4.66	29.75	(13.89)	58.38	(19.18)
Company Size							
Small/Medium	0.05	7.85	0.23	8.14	(7.68)	7.06	(3.15)
Large	0.77	34.40	7.25	42.43	(21.22)	88.47	(28.95)
Industry							
Software	0.38	11.83	4.14	16.35	(9.14)	38.34	(20.74)
Hardware	0.56	30.76	4.91	36.24	(20.03)	68.08	(26.46)

Note: Standard errors in parentheses. Results are for a subsample of 46 companies that reported full litigation and nonlitigation costs. Figures are totals over 2005–2011 per company, although not all companies reported all years.

In any case, it is clear that nonlitigated patent assertions are responsible for much of the direct costs imposed by NPEs on operating companies. In this regard, it is likely that our sample underrepresents these costs because we have only surveyed companies that have been involved in litigation. That is, we have not included the potentially large number of small companies that have only settled NPE patent assertions and have not gone to court. Anecdotal evidence from small companies suggests that there might be very many such firms, and their costs are missing from our analysis.[85]

84 *See infra* Table 3. Colleen Chien surveyed 223 high-tech start-ups and found that "the likelihood that a company reported an actual litigation, rather than the threat of one, increased with revenue. Lawsuits represented only 31% of demands received by companies with under $10M in revenue, but 67% of demands received by companies with over $10M in revenue." Colleen Chien, *Startups and Patent Trolls*, 17 STAN. TECH. L. REV. (forthcoming 2014) (manuscript at 10 n.57), *available at* http://digitalcommons.law.scu.edu/facpubs/553.

85 *See* Chien, *supra* note 84 (manuscript at 2) (finding that 18% of small companies settled due to higher litigation costs); Robin Feldman, Patent Demands & Startup Companies: The View from the Venture Capital Community 35, 38 (Oct. 18, 2013) (unpublished manuscript), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2346338

IV
Aggregate Costs of NPE Assertions

A. Aggregation

What is the aggregate cost of NPE patent assertions, including both litigated and nonlitigated assertions? To estimate this, we began by estimating the mean cost of resolved litigation for small and medium-sized firms and for large firms. We could have directly used the data in Table 2, but this might overstate costs because the average small or medium-sized firm in our survey sample is larger than the average small or medium-sized firm in the entire database.[86] To correct for this within-category variation, we regressed log cost against log revenue for the survey sample and, using this, computed the predicted mean cost over the actual distribution in the database for each size category.[87] In using these means, we assume that the lawsuits in each category in the database will, on average, accrue costs equal to these respective mean values. That is, for lawsuits where a third party indemnified the defendant, we assume that some party will pay an amount equal to the mean cost for defendants in that category even if the defendant firm itself does not necessarily pay this amount. Also, we assume that lawsuits that are still underway will eventually accrue costs equal to these means even if the current out-of-pocket costs are not yet equal to this accrued cost.

To adjust these figures to account for nonlitigation assertions, for each category we divided the total nonlitigation cost by the total number of lawsuits filed, including lawsuits that were still active. This gave us a prorated nonlitigation cost per lawsuit filed. We added this to the mean litigation cost for each category to give a total cost of NPE assertions per lawsuit filed.[88]

The second part of this exercise consisted of breaking the cases in the RPX NPE database into the two size categories. Where revenue was reported (about 74% of the database), we allotted the defenses to small and large cells depending on whether the revenue was smaller

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(finding that over 30% of venture funded start-ups received patent demands, and that "monetizers" initiated most of these demands).

86 *See infra* Table 1. In fact, we calculated aggregate costs using the data in Table 2, including the software and hardware categories. These estimates came out about 5%–10% higher than those reported in Table 4.

87 Regressions are reported in the Appendix. We used a regression that also included a dummy variable for firms with less than $100 million in revenue in order to capture a nonlinearity in the relationship between log cost and log revenue. The predicted mean cost per litigation was $1.527 million for small and medium-sized firms and $5.641 million for large firms. We also ran regressions using hardware and software dummy variables, but the coefficients on these dummies were not statistically significant.

88 These are $3.17 million for small and medium-sized firms and $7.59 million for large firms.

than or larger than $1 billion.[89] We conservatively assigned those companies without reported revenue to the "small" cells.

B. Year-by-Year Accrued Costs

The left portion of Table 4 presents the number of defenses reported in the NPE database by year for each size category. The right portion shows the aggregate cost of NPE assertions per year, which we calculated by multiplying the number of defenses reported on the left by the prorated total cost of defense per cell (where the cost of defense includes licensing costs). The final column reports the aggregate cost, summing over both categories for each year. Aggregate direct costs of NPE patent assertions grew rapidly from about $7 billion in 2005 to $29 billion in 2011.[90]

TABLE 4. AGGREGATE ACCRUED DIRECT COSTS OF NPES BY YEAR

	Number of Defenses		Aggregate Direct Accrued Costs (millions)		
Year	Small/Medium	Large	Small/Medium	Large	TOTAL
2005	919	482	$2,916	$3,657	$6,574
2006	899	530	$2,853	$4,021	$6,874
2007	1,238	976	$3,929	$7,406	$11,334
2008	1,571	1,004	$4,985	$7,618	$12,603
2009	1,461	1,198	$4,636	$9,090	$13,726
2010	2,588	1,857	$8,213	$14,090	$22,303
2011	3,424	2,418	$10,866	$18,347	$29,213
Size shares	59%	41%	37%	63%	

Note: Aggregate costs are calculated by the method described in the text. Aggregate costs include legal costs, settlement costs, and other costs for resolved lawsuits, unresolved lawsuits, and nonlitigated assertions. These report accrued costs—that is, we include the full projected cost of currently unresolved lawsuits.

It is important to note that these totals represent *accrued* costs, not necessarily the immediate out-of-pocket cost. That is, we accrue the projected cost of a lawsuit in the year in which the suit was filed even though the lawsuit might not be resolved. This is important because about half of the lawsuits filed in 2011 were not resolved at the time of our survey. The implication is that substantial sums will be flowing to NPEs over the next several years from lawsuits already filed. Because the number of NPE lawsuits has been growing so rapidly, the

89 RPX gathered revenue data from the financial statements of publicly listed firms as well as estimates based on information such as number of employees available for private firms. Revenues were not reported when a private firm could not be definitely identified in their data sources.

90 As a point of comparison, Polinksy and Shavell calculate that "the litigation costs associated with the U.S. tort system are approximately $46 billion per year." A. Mitchell Polinsky & Steven Shavell, Costly Litigation and Optimal Damages 2 (Jan. 24, 2012) (unpublished manuscript), *available at* http://ssrn.com/abstract=1990786.

current revenues of NPEs likely understate the total costs of lawsuits already filed.[91]

Moreover, the effect of these assertions does not just fall on a small number of large companies. Some NPE advocates have argued that NPE litigation is largely a matter of lawsuits against a small number of large "serial infringers."[92] To the contrary, these data show that about 59% of the litigation events are directed to small and medium-sized companies and about 37% of the aggregate cost falls on small and medium-sized companies. Moreover, this share is likely understated because, as discussed above, this analysis does not include those companies that have only faced NPE assertions that did not go to court.

Finally, these tabulations do not include the indirect effects of NPE assertions on defendants' businesses. Case-study evidence suggests there are significant indirect costs of NPE patent assertions.[93] These include diversion of management or engineering resources, delays in new product introductions and improvements, loss or delay of revenue, and credit constraints. Bessen, Ford, and Meurer estimate the total business costs of NPE litigation for public firms using stock market event studies.[94] Although the samples and methods are not directly comparable, they find an aggregate loss of stock market capitalization of around $80 billion per year during recent years, corresponding to an aggregate cost in operational funds to the firms of about half that amount.[95] This suggests loosely that total business costs of NPE assertions might be at least twice as large as the figures reported in Table 4.

C. Benefits to Innovators

It is sometimes argued that NPEs facilitate innovation by providing incentives to small inventors who would not otherwise be able to license their patents.[96] In this view, "NPEs create patent markets, and those markets enhance investment in start-up companies by providing

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91 We also caution readers not to rely on intuition based on the median cost of defending against NPE patent assertions. Median cases are "typical," but of course it would not be correct to multiply the median cost by the number of assertions to calculate aggregate costs numbers.

92 Patrick Anderson, *Did Serial Infringers Commission "Academic" Patent Study to Support Widespread Infringement?*, GAMETIME IP (Sept. 20, 2011), http://gametimeip.com/2011/09/20/did-serial-infringers-commission-academic-patent-study-to-support-widespread-infringement/.

93 *See* Tucker, *supra* note 24, at 26–28.

94 *See* Bessen et al., *supra* note 1, at 26, 28.

95 *See id.* at 26 (finding that the "defendants are mostly technology companies that invest heavily in R&D").

96 *See* McDonough, *supra* note 14, at 190; Risch, *supra* note 32, at 459; Shrestha, *supra* note 14, at 115–16.

additional liquidity options. NPEs help businesses crushed by larger competitors . . . who infringe valid patents with impunity."[97]

How much of the costs accrued by defendants actually flow to inventors? We can gain some indication of this by looking at the expenditures of publicly listed NPE firms. Examining the 10-K filings of these firms, we identified the licensing revenues that these firms received as well as the payments these firms made to inventors in the form of royalties (when the inventor kept title to the patent) and patent-acquisition payments (when the NPE bought the patent).[98] We also obtained the amount the NPE firm spent on its own R&D, which some of these firms perform in order to acquire more patents. Table 5 reports the mean annual payments for those years where we could identify both licensing revenues and payments to inventors.[99]

TABLE 5. ANNUAL PAYMENTS FROM DEFENDANTS TO NPES AND INVENTORS

	Annual Expenditures ($2010 millions)		Share of Defendant Payments	
Payments from Defendants				
Licensing Revenues of NPEs	$1,161		77%	
Implied Defendant Legal Cost	$348		23%	
TOTAL Defendant Payments	$1,510		100%	
Payments for Invention				
Royalties + Patent Acquisition	$59		5%	
Small Inventors		$32		3%
Large Inventors		$27		2%
NPE Own R&D	$169		15%	
NPE Operating Costs	$818		47%	
NPE Net Income	$115		10%	
	$1,161			

The top panel of the table displays the out-of-pocket payments made by defendants. The licensing revenues are the mean settlement payments that these NPEs received per year, totaling just over $1 billion in 2010 dollars. Using the mean ratio of defendant legal costs to settlement costs from Table 2 (.3 to 1), the second row of Table 5

97 Risch, *supra* note 32, at 459 (footnote omitted).

98 *See infra* Table 5. In some cases we used patent-acquisition payments from the Cashflow Statement; in others, we used the amortization of patent assets from the Income Statement. The latter includes more than just payments to inventors, such as legal costs related to patent acquisitions.

99 The data include the following years for each company: Acacia, 2007–11; Asure, 2002–06; Interdigital, 2004–11; Network-1, 2003–11; OPTi, 2002–10; Rambus, 2003–11; Tessera, 2005–11; Virnetx, 2007–11; and Wi-Lan, 2006–11. Figures for Tessera only include the Intellectual Property business unit.

shows the imputed defendant legal cost, summing to a total annual cost to defendants of $1.5 billion from this group of NPEs.

The second panel shows the flows to inventors and to NPEs' R&D departments. Payments to independent inventors come to only 5% of the direct costs to defendants (and are only 7% of NPE licensing revenues). Note furthermore that this figure likely overstates the long-term flow of funds to inventors because it compares current licensing revenues to current patent-acquisition payments, but the patents acquired will likely accrue additional licensing revenues in the future.[100] If we include payments to the NPEs' own R&D departments, then, loosely, payments to inventors come up to 20% of defendants' costs. Finally, 47% of the direct costs to defendants are eaten up by NPE operating costs, and another 10% are NPE profits.

Based on these figures, it seems difficult to make a convincing argument that the effect of NPEs is to increase innovation incentives. First, previous research has shown that the defendants in these lawsuits are largely tech companies that invest heavily in R&D.[101] This estimate suggests that their losses are much larger than the possible flows to small inventors, especially if one adds indirect costs of NPE litigation to the direct costs reported in Table 5. Effectively, what defendants pay in costs as a result of NPE litigation reduces their own R&D budgets. Small inventors would have to be an order of magnitude more innovative per dollar of R&D than the defendant companies in order for the net effect on innovative activity to be positive.

Second, to the extent that small inventors are important for innovation, NPE patent assertions hinder innovation by hurting small inventors in at least two ways. As we have seen, the majority of defendants in NPE lawsuits are small and medium-sized companies, and these companies accrue larger costs relative to their size.[102] Risch finds that the median revenue of a company filing an NPE patent in his sample is $6.3 million.[103] Given that the median revenue of a company in the RPX database of firms sued by NPEs is $10.8 million, it appears that the typical firm sued by an NPE is roughly the same size as the typical firm benefiting from NPE activity. Also, these costs

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100 We also include licensing revenues from patents acquired in the past, but patent acquisitions have been increasing rapidly, so this is a much smaller effect.

101 *See* Bessen et al., *supra* note 1, at 26.

102 *See* Chien, *supra* note 84 (manuscript at 5–6) (illustrating the costs on small companies). "66% to 82% of unique defendants in NPE cases made less than $100M" per year. *Id.* (manuscript at 10). Their small size makes them more vulnerable and less able to absorb the impacts of demands: 40% of survey respondents reported that their company delayed hiring or achievement of another milestone, changed the product, pivoted their strategy, shut down a business line or the entire business, and/or lost valuation due to a patent demand. *See id.* (manuscript at 12). "The smaller the company, the less able it was to absorb the impact of a lawsuit without a significant impact . . . ." *Id.* (manuscript at 13).

103 Risch, *supra* note 32, at 488.

make things more difficult for small inventors who wish to license their technology—not just their patents—to other firms. If the prospective licensees expect NPE-related costs, they will be less willing to license from small inventors or will not be willing to pay as much.

Third, the incentives provided to patent holders by the current crop of NPEs may be the wrong kind of incentives. NPE activity may skew the research agenda of small firms away from disruptive technologies and toward mainstream technology and associated patents that can be asserted against big incumbents. Even worse, small firms are encouraged to divert investment from genuine invention toward simply obtaining broad and vague patents that might one day lead to a credible, if weak, lawsuit.[104]

The publicly listed NPEs are only a part of the population of NPEs, but they are an important part, accounting for about one-sixth of all NPE lawsuits.[105] It is possible that the private NPE firms might pay higher royalties to inventors or pay more to acquire patents. But there is no evidence of this, nor any evidence to support the common assertions from patent lawyers that NPEs help small inventors. The available evidence suggests instead that NPEs burden small firms.

V
Response to Critics

An earlier version of this Essay has attracted significant criticism. The most thoughtful commentary comes from David Schwartz and Jay Kesan whose work appears in the same issue of the *Cornell Law Review*.[106] In this Part, we address our critics, with special attention given to Schwartz and Kesan. For convenience, we have organized the critical comments into three main questions.

A. Have We Overstated the Direct Costs from NPE Disputes?

Given the explosion of NPE patent litigation, it is difficult to pin down precisely the direct costs to defendants, but we believe that the $29 billion annual figure derived above is a plausible estimate; the true number could be higher or lower. Before we take issue with the claims that our estimate is biased upward, we take a moment to review some findings that do not seem to be disputed.

We have not read anyone who seriously disputes that NPE patent litigation has exploded. Something important is happening. Over a

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104 *See* Chien, *supra* note 84 (manuscript at 18) ("Among the 90 patentees [listed] on the 'Investor Testimonials,' 'Inventor Spotlight,' and 'Senior Spotlight,' sections of [two NPEs'] websites, based on our analysis, less than 15% appeared to be connected to still practicing companies not focused on patents." (footnotes omitted)).

105 Calculation by authors.

106 Schwartz & Kesan, *supra* note 44.

decade, the amount of NPE litigation has grown from less than 5% of all U.S. patent litigation to over 60%.[107] We have not read anyone who seriously disputes that NPEs have a bargaining advantage over practicing-entity patent plaintiffs because NPEs are invulnerable to patent counterclaims and have lower litigation costs, especially discovery costs.[108] We have not read anyone who seriously disputes that NPE litigation is concentrated in business method, software, and computer technologies, technologies for which many believe the U.S. patent system performed poorly even before the rise of NPE litigation.[109] These observations suggest that NPEs have rushed in to exploit failings in the patent system by displacing operating-company plaintiffs because the NPEs can more effectively extract payments from innovators who are targeted as defendants through no fault of their own. Thus, the case for new patent-policy reform was already made before this study.

Returning to the costs from NPE disputes, we first observe that the total costs to defendants may far exceed $29 billion once the indirect costs of NPE disputes are accounted for. Our event-study research indicated that the annual aggregate cost to defendants from NPE lawsuits is about $80 billion.[110] The survey that we describe in this Essay did not attempt to quantify the indirect business costs from NPE patent assertions because the lawyers who received the survey probably did not have good information on indirect costs.

The event-study methodology captures the reaction of stock market investors to the filing of an NPE lawsuit. Investors care about and have reason to learn about both direct and indirect costs borne by defendant firms because these costs are reflected in changes in share value.[111] Schwartz and Kesan criticize the event studies for two reasons. First, one professor has "harshly criticized" this methodology.[112] Second, they tell us that the estimates do not correspond with

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107 *See* Gwendolyn G. Ball & Jay P. Kesan, *Transaction Costs and Trolls: Strategic Behavior by Individual Inventors, Small Firms and Entrepreneurs in Patent Litigation* 15 (Univ. of Ill. Coll. of Law, Ill. Public Law & Legal Theory Papers Series No. 08-21, 2009), *available at* http://ssrn.com/abstract=1337166.

108 *See* Bessen et al., *supra* note 1, at 34.

109 *See id.* at 29, 34–35; Shawn P. Miller, *Where's the Innovation? An Analysis of the Quantity and Qualities of Anticipated and Obvious Patents*, 18 VA. J.L. & TECH. 5–6 (2013) ("[O]pportunistic litigation by licensing firms may disproportionally add to increased costs because the more uncertain scope of software and business methods makes these patents ideal tools to extract rents from independently inventing producers in 'hold up' litigation.").

110 Bessen et al., *supra* note 1, at 26.

111 *See id.* at 29–31.

112 Schwartz & Kesan, *supra* note 44, at 447 & n.12 (discussing Glynn S. Lunney, Jr., *On the Continuing Misuse of Event Studies: The Example of Bessen and Meurer*, 16 J. INTELL. PROP. L. 35 (2008)). Lunney is skeptical of the efficient market hypothesis that is central to financial economics. *See* Lunney, *supra*, at 53–54.

their personal experiences as patent attorneys.[113] Nevertheless, this methodology is widely accepted and has been used in over a thousand research studies.[114] And we suspect that our sample of 2,887 events for publicly listed firms is likely far more representative than the experience of a few attorneys who are unlikely to have direct knowledge of investor losses in any case.[115] Although the event study needs to be interpreted carefully, this sort of criticism does little to dispel the indication that the private costs of NPE disputes might well be higher than $29 billion.

Critics have identified two different types of biases that might cause our survey-based measures of direct costs to be overstated: misleading responses by respondents (or manipulation by RPX), and statistical bias attributable to the survey sample or the survey response pattern.[116] We do not take the first type of criticism seriously. This study provides the best-available survey data related to activities that are usually shrouded in secrecy. Ideally, the federal government will take steps to make patent settlement and licensing more transparent and make more empirical analysis of NPE patent litigation possible.[117] We cannot guarantee the honesty of survey respondents, but we assume for the most part they simply copied data from available business records for their survey responses. Why would a respondent be dishonest when there is so little to be gained from the distortion of a single survey response? And RPX has reputational concerns that lead us to believe that it was in its best interest to help us produce an honest report.[118] We have not received any compensation from RPX or

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113 Schwartz & Kesan, *supra* note 44, at 448.

114 Our search of scholarly papers in the SSRN archive, http://www.ssrn.com, found 2191 papers using the key words "event study."

115 Schwartz and Kesan also point out that the event studies are only for publicly listed firms. Schwartz & Kesan, *supra* note 44, at 447. That is correct; including private firms would make the aggregate cost even higher. They also criticize the study for not considering what happens after the lawsuit is filed. In fact, the paper does look for evidence of a bounce back by extending the event-study window, but finds, to the contrary, that losses deepen. And the paper discusses the literature that finds that stock market values are not restored when the lawsuits are settled.

116 *See id.* at 434–35, 446.

117 *See* Mark Bohannon, *The FTC Roadmap on Patent Litigation Aggressors*, OPENSOURCE.COM (July 1, 2013), http://opensource.com/law/13/7/ftc-patent-litigation-roadmap (describing possible FTC investigation of the activities of PAEs).

118 The GAO apparently trusted RPX data enough to use it to verify the accuracy of litigation data from Lex Machina, though the GAO indicated it was "not able to fully assess the reliability of the judgments RPX used in making [litigant] classifications." *See* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-13-465, INTELLECTUAL PROPERTY: ASSESSING FACTORS THAT AFFECT PATENT INFRINGEMENT LITIGATION COULD HELP IMPROVE PATENT QUALITY 5 n.14 (2013), *available at* http://www.gao.gov/assets/660/657103.pdf.

any other source to carry out this research.[119] This project fits nicely with our long-standing research interests.

Schwartz and Kesan have more plausible concerns about sample and response bias. They argue that our sample of firms (RPX clients or firms that have some relationship with RPX) has higher-than-average litigation costs and that, among this sample, the firms that are most likely to respond are the firms with the highest litigation cost.[120] Then they observe that if these biases are present, it is not appropriate to impute the mean costs derived from our survey to the entire population of NPE defendants.[121]

Out of concern about possible biases, Part III.B demonstrates the plausibility of our results by benchmarking the outside legal costs and licensing payments measured in this study against patent-litigation cost measures derived from other data sets using a variety of methods.[122] In particular, we use two different sources of data on patent litigation costs to confirm that the payments for patent defenses reported in the survey are plausible. Furthermore, we show that the license revenue per lawsuit derived by publicly traded NPEs corresponds closely to licensing payments reported in the survey.[123] Of course, critics may question whether publicly traded NPEs differ systematically from nonpublic NPEs in terms of their license revenue per lawsuit. Once again, the lack of transparency concerning patent licenses blocks us from further investigating this question.

Why doesn't the bias suggested by Schwartz and Kesan appear in our survey data? They have merely identified *possible* biases; they have not established that these are significant. Indeed, we provide estimates of the costs of litigation from three different sources (survey, publicly listed NPEs, and stock market event studies) and these are all more or less consistent once differences in the costs being measured are taken into account. It is possible, of course, that *all three* of these data sources represent biased samples, but that seems unlikely, and Schwartz and Kesan would need to come up with some explanation for why all three would have similar biases.

Moreover, there are a priori reasons to believe that the biases are not present or even push the data in the opposite direction. To understand the possible sample bias, one must understand why firms

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119 We did receive funding for a summer research assistant from the Computer and Communications Industry Association, and we have a grant from the Kauffman Foundation that provides us general research support.

120 Schwartz & Kesan, *supra* note 44, at 434–35.

121 *Id.* at 436.

122 *See supra* text accompanying notes 64–71.

123 *See supra* text accompanying notes 74–76.

subscribe to the RPX service.[124] If the main effect of RPX membership is a fixed reduction in expected litigation cost per defense, then high-frequency defendants are more likely to select membership; however, there would be no relationship between membership and expected cost per suit and thus no sample bias. It is even possible that certain firms who face NPE suits at a high frequency have a relatively high aggregate, expected NPE-lawsuit defense cost and *lower*-than-average defense costs per suit.[125] This could happen if experience with NPE suits makes defendants more efficient—perhaps because they have previously gathered relevant documents to meet discovery requests, trained personnel to handle depositions, developed litigation strategies, or the like.[126] Schwartz and Kesan's discussion of response bias also confounds litigation frequency with cost per defense. They speculate that respondent firms likely had "easier access to the information."[127] Perhaps this is true (we have no way to know), but this seems to be an attribute associated with frequency of litigation and not with magnitude of defense costs. Finally, they suggest various reasons why large firms are overrepresented in our sample and contend that this may distort our results.[128] We are careful to note that large firms do indeed face higher costs (and small firms face higher costs relative to their revenue), but we account for this difference in the extrapolation that yields our aggregate-cost figure.

In the two years since we first published our event study, no one has come forward with actual empirical evidence to suggest our estimates are substantially biased. Certainly, more data and better research could generate lower estimates, but Schwartz and Kesan simply have no empirical basis for their conclusion that the $29 billion estimate is "substantially overstated."[129]

B. Is $29 Billion in Direct Costs Really a Problem?

Yes, a $29 billion tax on innovation is a problem that keeps us up at night. Not much of this payment goes to inventors or innovators; rather, most of the payment is dissipated by transfers to the NPEs'

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124 Firms select RPX service if the subscription fee is less than the expected litigation savings. RPX seeks to reduce expected litigation costs by acquiring patents, by facilitating syndicate patent purchases by members, by providing litigation intelligence, and recently by offering insurance. *Reducing Patent Risk*, RPX, http://www.rpxcorp.com/rpx-services (last visited Oct. 17, 2013).

125 As Schwartz and Kesan suggest, other assumptions are consistent with RPX membership being positively correlated with high costs per defense. Schwartz & Kesan, *supra* note 44, at 435.

126 One additional point: because the RPX subscription fee rises with firm size, it is not clear that only large firms with high litigation exposure select membership.

127 Schwartz & Kesan, *supra* note 44, at 435.

128 *Id.* at 435–36.

129 *Id.* at 455.

owners, investors, and personnel, and to the lawyers representing both the NPEs and the defendants.[130] Most importantly, the direct costs from NPE disputes are borne by firms because they chose to innovate and thereby exposed themselves to the largely unavoidable risk of an NPE lawsuit.[131] Unfortunately, this tax on innovation for defendant firms is not counterbalanced by significant transfers from NPEs to other inventors or innovators.[132] Hence, patent assertion by NPEs constitutes a tax on innovation.

Schwartz and Kesan assert, to the contrary, that most of what defendants pay is merely a transfer to "meritorious" patent owners.[133] They note that defendants' payments to outside counsel are less than one-quarter of the total direct cost.[134] But that is not quite right: they forget that NPEs also spend on legal fees and other operating costs. As we see from Table 5, for publicly traded NPEs, about 70% of the payments that defendants make go to the legal costs of both parties or to the operating costs of the NPEs.[135] We see no evidence that private NPEs are any more efficient at transferring wealth to worthy inventors.

Schwartz and Kesan counter that the data in Table 5 are unrepresentative because they come from a small number of NPE firms and because that sample includes three firms that conduct substantial R&D in-house (Interdigital, Tessera and Rambus).[136] The NPEs in that sample account for about one-sixth of all of the lawsuit defenses in the total database, so while the sample is hardly a small one, it might be unrepresentative. However, there is no reason to conclude that it necessarily is unrepresentative, and, in fact, several of the large, private NPEs are also known to conduct their own R&D.[137] Nevertheless, this table sharply contradicts the common rhetoric about the benefits of NPEs: most of the money that defendants pay does not represent a transfer to inventors; instead, it is largely consumed by legal and operating costs. If we exclude the three R&D-performing firms, then 78% of the cost is consumed by these costs while 21% flows to inventors. The evidence, although limited, suggests that NPEs are hardly a socially efficient way of funding inventors.

Schwartz and Kesan also fail to consider the dynamic effect on innovation incentives caused by the costs arising from inadvertent in-

130 *See* Bessen et al., *supra* note 1, at 33.
131 *See id.*
132 *See id.*
133 *See* Schwartz & Kesan, *supra* note 44, at 438–39.
134 *Id.*
135 Depending on how one counts profits, only a couple percent flows to NPEs' profits.
136 Schwartz & Kesan, *supra* note 44, at 443–45.
137 *See, e.g.*, *Intellectual Ventures Laboratory*, INTELL. VENTURES, http://www.intellectualventures.com/index.php/inventions-patents/iv-lab (last visited Oct. 17, 2013) ("Intellectual Ventures Laboratory's mission is to conduct advanced research on some of IV's most promising inventions.")

fringement. They fundamentally misapprehend the patent-policy framework we developed in *Patent Failure* and apply in this Essay. In *Patent Failure*, we measured the aggregate benefits that large American firms derived from their patents and the costs they incurred because of the assertions of other parties' patents.[138] We studied the period from 1984 to 1999, a time before NPE litigation was significant, and we found that for most technologies and most industries, the U.S. patent system imposed a net tax on innovation.[139] We attribute this failure to the deterioration of the notice function of the patent system.[140] Especially for business methods and software, the patent system provides innovators who might be targeted with a patent suit with little information about the existence, ownership, or scope of relevant patent rights.[141] The patent tax that we identified in our book arises because of legal costs, various indirect business costs, and transfers in the form of license and damages payments. Innovation is equally discouraged by the payment of legal costs and the payment of transfers.

What Schwartz and Kesan are really expressing is simply their hope that the license payments gained by NPEs provide a positive incentive for invention and innovation, and that this incentive more than offsets the harm done to defendants. But we already know that the aggregate value of patent-based incentives is smaller than the aggregate value of negative incentives in the sectors affected by NPE litigation.[142] Furthermore, we cast serious doubt on their premise that NPEs actually provide a significant incentive for invention or innovation. In Part V.C, we show that publicly traded NPEs transfer a small fraction of the costs that they impose to inventors.

Schwartz and Kesan's line of argument appeals to many commentators who believe that NPEs provide a special benefit to small firms and independent inventors by vindicating their patent rights.[143] At the outset, we are suspicious of this argument because the small inventors who really get a significant return from their patents in the bi-

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138 BESSEN & MEURER, *supra* note 34, at 95–146.

139 *See id.* at 138–46.

140 *See id.* at 147–64.

141 *See id.* at 187–214. We build the case that most patent infringement is inadvertent. For example, we show that patent defendants are hardly ever shown to be copyists. *Id.* at 126; *see also* Christopher A. Cotropia & Mark A. Lemley, *Copying in Patent Law*, 87 N.C. L. REV. 1421, 1451 (2009) (finding that out of a data set of 1871 patent infringement opinions, 129 of them included allegations of copying, and that of these 129 opinions, copying was found only in 33 cases).

142 BESSEN & MEURER, *supra* note 34, at 145.

143 *See* McDonough, *supra* note 14, at 223; Shrestha, *supra* note 14, at 118; *cf.* Myhrvold, *supra* note 22 (arguing that inadequate funding severely hinders innovation and that NPEs can help create a capital market to fund inventions). *But see* Feldman, *supra* note 85, at 53 (finding that 65% of surveyed "venture capitalists disagreed with the statement, '[a]s a venture capitalist, in making funding decisions, I consider the potential for selling patents to patent assertion entities if the companies fail.' Only 18% agreed.").

otech and medical-device industries have flourished without relying on NPE enforcement.[144] We have trouble seeing how a trickle of NPE payments to small firms in the tech sector makes much difference to the overall rate of innovation. We note that the majority of small high-tech firms do not rely on patent protection to profit from their R&D.[145] We also note that only about one-half of the patents asserted by NPEs come from small firms and independent inventors.[146] And this study shows that most of the firms sued by NPEs are, in fact, small firms. These findings suggest that NPEs do more to discourage innovation among small firms than they do to encourage it.

C. Are There Good NPEs?

A third significant line of criticism is that our critical treatment of NPE patent litigation lacks nuance. Critics contend that certain NPEs play socially valuable roles and that they get unfairly tarnished because of the actions of other problematic NPEs.[147] Peter Detkin from Intellectual Ventures commented on our work. The following is an excerpt from Gametime IP's report of its interview with Detkin:

> "They are taking a small piece of the puzzle and extrapolating out to the entire puzzle," explains Detkin. He believes that the basic premise behind the research is a real phenomenon—that there are bad actors who impose costs onto everyone because of the improper way in which they use the legal system. "When I coined the term 'troll' more than 10 years ago, I was talking about people who take specious patents that were likely invalid and asserted them broadly across an industry to extract nuisance value settlements." Ten years later, Detkin thinks some of the research validates his suspicions that a lot of people are "gaming the system and that there is a consummate cost to society."
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> . . . "To me, when you win at trial and on appeal, that means that your patents are not of 'doubtful validity' anymore." In fact, the amount of the settlement alone speaks volumes about the strength

144 *See* Bessen et al., *supra* note 1, at 29 (finding that only 1% of NPE lawsuits arise in drug or medical-technology patent classes).

145 *See* Stuart J.H. Graham et al., *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey*, 24 BERKELEY TECH. L.J. 1255, 1287, 1291–92 (2009); *Do Patents Really Matter to Startups? New Data Reveals Shifting Habits*, TECHCRUNCH (June 21, 2012), http://techcrunch.com/2012/06/21/do-patents-really-matter-to-startups-new-data-reveals-shifting-habits/; *cf.* James Bessen, *A Generation of Software Patents*, 18 B.U. J. SCI. & TECH. L. 241, 255–57 (2012) (showing that most software firms do not patent and that the increase of patenting in the software industry is due to a few large firms).

146 Colleen Chien, *A Race to the Bottom*, INTELL. ASSET MGMT., Jan./Feb. 2012, at 10, 13 fig.2 (using RPX data to show that 50% of litigated patents are owned by small companies).

147 *See* McDonough, *supra* note 14, at 223; Shrestha, *supra* note 14, at 118; *cf.* Myhrvold, *supra* note 22 (defending the author's own company as one that promotes investment in applied research).

> of NTP's claims. As former head of IP litigation for Intel, Detkin agreed, saying "I would have to be hard pressed to go to my management and say 'You should pay more than half a billion dollars for patents we don't think we infringe.'"[148]

We certainly acknowledge that some types of NPE behavior are likely to be socially desirable. Certain NPEs administer patent pools; others facilitate technology transfer and the outsourcing of R&D. However, we disagree with the view that only "nuisance value"[149] trolls are problematic. NPEs that press their assertions on to trial have a strikingly low win rate,[150] and even those that find a measure of success in court generally cause harm to innovation.

We disagree with Detkin and with Schwartz and Kesan that an NPE like NTP is meritorious, and we lament the ability of NPEs to extract large settlements or court awards from small, innovative firms like RIM. We believe that the NTP suit is a poster child for the problem of patent notice failure and harmful patent assertion by NPEs. NTP was founded by a failed wireless e-mail innovator named Campana and his patent attorney.[151] Campana obtained patents on wireless e-mail containing vague claims that were hidden from RIM during the early years of research and development of the BlackBerry.[152] RIM was unaware of Campana's invention and did not become aware of his patent until after they had succeeded with their innovation.[153] Nevertheless, RIM was forced to share the fruits of its success with NTP, a company that contributed nothing to the BlackBerry.[154] Supporters of NTP might consider them "meritorious" because they achieved litigation victories in court (although the asserted claims were later invalidated during reexamination)[155] and a large settlement payment. Our view is that NTP acted opportunistically to expropriate a portion of the rewards earned by a genuine innovator.

Schwartz and Kesan accuse us of focusing on the wrong question, asserting that the real question is "whether the lawsuits are being

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148 Anderson, *supra* note 80.

149 *Id.*

150 *See* Allison et al., *Repeat Patent Litigants*, *supra* note 3, at 687 (finding that the win rate for the most litigated patents is 10.7% compared to 47.3% for once-litigated patents). Win rates must be interpreted cautiously because cases that go to trial may differ from cases that are settled. One study that controls for selection bias estimates that 28% of NPE patents would be found at least partially invalid for lack of novelty or for obviousness if they were litigated through trial. *See* Miller, *supra* note 109, at 6–7.

151 BESSEN & MEURER, *supra* note 34, at 49–50.

152 *See id.* at 49–50, 124–25.

153 *See id.* at 49.

154 *See id.*

155 Although NTP succeeded in court, the relevant patents were invalidated during reexamination at the PTO—too late to benefit RIM. The Federal Circuit affirmed the invalidation of one of the NTP patents and partially reversed and remanded the findings of invalidity for the other patents. *See In re NTP*, 654 F.3d 1279, 1289–90 (Fed. Cir. 2011).

brought because the defendants are infringers of a valid patent."[156] However, standard economic-welfare analysis implies that patent litigation even over valid patents can be socially harmful. If litigation incurs tens of billions of dollars of socially wasteful expenditure each year, then this represents a static loss in social welfare. If litigation also decreases innovation incentives, then the social losses could be much larger. Large numbers of expensive lawsuits by NPEs impose substantial costs on society regardless of whether the patents involved are valid or not.[157]

VI
Policy Implications

The rapid growth and high cost of NPE litigation documented here should set off an alarm, warning policymakers that the patent system still needs significant reform to make it a truly effective system for promoting innovation. The heterogeneous nature of NPEs—ranging from universities to semiconductor-design firms to trolls—suggests that policy reform should address troll-like behavior rather than merely status as an NPE.[158]

The top priority is reform of the patent system to improve notice; this kind of reform will make the patent system perform more like an idealized property system.[159] More rigorous enforcement of the claim-definiteness standard would be an excellent step forward. Likewise, we favor rigorous implementation of recent Supreme Court deci-

156 Schwartz & Kesan, *supra* note 44, at 455.

157 Schwartz and Kesan appear to misunderstand that we applied the label of "deadweight loss to society" to socially unnecessary expenditures related to litigation and assertion. *See also* Bessen & Meurer, *supra* note 30, at 61 & n.11 (describing "deadweight losses"). They assert, incorrectly, "Bessen and Meurer's calculation assumes every time a small inventor licenses a patent to a practicing company, it results in a 'deadweight loss,' regardless of the merits of the infringement claim." Schwartz & Kesan, *supra* note 44, at 440–41. That is not so. First, ex ante licensing typically does not involve much transaction costs by comparison to the kind of ex post licensing that NPEs do. We only measure the activity of NPEs and only count social losses to the legal and operating costs, not to actual transfers to inventors or NPE investors.

158 *See* Robert P. Merges, *The Trouble with Trolls: Innovation, Rent-Seeking, and Patent Law Reform*, 24 Berkeley Tech. L.J. 1583, 1587 (2011) (distinguishing between "patentees who make real contributions to innovation and those who do not"); Damien Geradin, Anne Layne-Farrar & A. Jorge Padilla, *Elves or Trolls? The Role of Non-Practicing Patent Owners in the Innovation Economy* 3 (Tilburg Univ., TILEC Discussion Paper No. 2008-018, 2008) (arguing that "the definition of all [NPEs] as patent trolls is far too broad and is unjustified by economic theory and evidence").

159 *See* Bessen & Meurer, *supra* note 34, at 215–26; Fed. Trade Comm'n, *supra* note 39, at 74; Peter S. Menell & Michael J. Meurer, *Notice Failure and Notice Externalities*, 5 J. Legal Analysis 1, 5–6 (2013). Lemley and Melamed also emphasize that patent reformers should focus on fundamental patent reforms that reduce the harm from patents asserted by both practicing and non-practicing entities. *See* Lemley & Melamed, *supra* note 4 (manuscript at 4–5).

sions restricting the patentability of business methods and other abstract processes that are difficult to propertize. It is also crucial to provide greater transparency in the patent system. Robin Feldman and Tom Ewing document the remarkable opaqueness of Intellectual Ventures in connection with its patent ownership and patent assertion.[160] Finally, courts should rigorously supervise patent-lawsuit damages awards to make sure that damages are proportionate to the value of the patented technology.[161] These reforms should not harm genuine inventors who crave publicity rather than secrecy and who should still be able to obtain broad but clear patent protection.

It is also instructive to look for policy reforms in the law and economics analysis of the generic problem of frivolous lawsuits. One promising policy reform is greater use of fee shifting to favor defendants in cases brought by trolls. Allison et al. find that troll patents fare poorly in court.[162] The bargaining power of a troll seeking a nuisance settlement would be greatly diminished in an aggressive fee-shifting regime. Similarly, more stringent pleading requirements have been justified in other areas of the law as a method of reducing frivolous lawsuits; this strategy might also work for patent litigation.[163]

CONCLUSION

Using survey data and the associated database of NPE litigation, our major findings are these:

The direct costs of NPE patent assertions are substantial, totaling about $29 billion accrued in 2011. This figure does not include indirect costs to the defendants' businesses such as diversion of resources, delays in new products, and loss of market share. Even so, the direct costs are large relative to total business spending on R&D, which totaled $247 billion in 2009,[164] implying that NPE patent assertions effectively impose a significant tax on investment in innovation.

Much of this burden falls on small and medium-sized companies, which make up about 59% of the companies sued and pay about 37% of the direct costs. NPE litigation costs smaller companies more relative to their revenues. In addition, smaller companies pay relatively more to NPEs in connection with assertions that do not go to court.

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160 Tom Ewing & Robin Feldman, *The Giants Among Us*, 2012 STAN. TECH. L. REV. 1, 3–5 (2012), http://stlr.stanford.edu/pdf/feldman-giants-among-us.pdf.

161 *See* Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 2044 (2007).

162 Allison et al., *Repeat Patent Litigants*, *supra* note 3, at 680.

163 *See, e.g.*, Douglas A. Blaze, *Presumed Frivolous: Application of Stringent Pleading Requirements in Civil Rights Litigation*, 31 WM. & MARY L. REV. 935 (1990) (discussing the stringent pleading requirements in the civil rights context).

164 *See* NAT'L SCI. BD., NAT'L SCI. FOUND., SCIENCE AND ENGINEERING INDICATORS 2012, at 4-4 (2012), *available at* http://www.nsf.gov/statistics/seind12/pdf/c04.pdf.

The burden of all of these costs appears to rebut the assertions that NPEs play an important role in improving the profits of innovative start-ups.

About a third of the cost to defendants involves patent assertions that do not go to court. Moreover, we have likely underestimated these costs because we have not surveyed small companies that do not also have NPE patent litigation.

NPEs appear to be highly heterogeneous. Much of the litigation appears to consist of nuisance suits that settle for a few hundred thousand dollars. But some NPEs are "big-game hunters" who seek and get settlements in the tens or hundreds of millions of dollars.

Little of the out-of-pocket payments made by defendants ends up in the pockets of small inventors. Only about 5% goes to independent inventors and roughly half of that goes to large firms. If one adds the R&D spending of some of the NPE companies, that share rises to 20%. Nevertheless, most of the out-of-pocket costs—roughly 70%—go to socially wasteful legal fees or to the NPEs' operating expenses.

These findings imply that the recent surge in NPE litigation is a significant social problem associated with billions of dollars of socially wasteful expenditure each year, as well as reduced innovation incentives for both small and large firms. Moreover, while NPEs appear to assert a high percentage of patents that would be found invalid if challenged in court, even valid patents impose social costs when litigated. More generally, our analysis suggests that a major cause of the high rates of litigation may be poor patent notice, which may create high levels of inadvertent infringement. In this sense, NPE litigation may be more a symptom of a deeper problem than the result of a particular business model.

We join our critics in the call for more research on the costs and potential benefits of NPEs. But we also note that legal scholars have now accumulated quite a bit of empirical evidence. In particular, over the last several years we have made three different estimates of the costs that NPEs impose on defendants, each using a different data source and a different methodology and estimating a slightly different measure.[165] Together, all three provide a reasonably consistent picture: these costs are substantial, and the available evidence further suggests that defendants' private costs correspond to substantial social costs as well. This picture might not correspond to preconceived notions about NPEs or to the personal perceptions of individual patent attorneys, but until better evidence comes along, this evidence provides an important guide for policy.

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165 *See* BESSEN & MEURER, *supra* note 34; Bessen et al., *supra* note 1; Bessen & Meurer, *supra* note 30.

Appendix

Table A1. Log Cost Regressed Against Log Company Revenue

	(1)		(2)	
	Coefficients	*Standard Error*	*Coefficients*	*Standard Error*
Intercept	10.30	(0.85)	10.90	(0.91)
Ln(Rev)	0.13	(0.04)	0.10	(0.04)
Revenue < $100m			-1.11	(0.63)

Note: 784 observations.